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PART VI.] [PRICE 2*s.* 6*d.*

A HISTORY OF BRITISH FOREST-TREES,

INDIGENOUS AND INTRODUCED.

BY

PRIDEAUX JOHN SELBY, F.L.S., M.W.S., ETC.

ILLUSTRATED BY A WOODCUT OF EACH SPECIES,
AND NUMEROUS VIGNETTES.

WISDOM OF GOD IN CREATION.

LONDON:
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BOOKSELLER TO THE ZOOLOGICAL SOCIETY.

S. BENTLEY, [1*st.* *Dec.* 1841.] SHOE LANE.

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By many modern botanists, our common Oak, the *Quercus Robur* of Linnæus, is supposed to include two distinct species, distinguished from each other by the following characters: the one with the acorns supported on short stems, or as it is termed pedunculated, and the leaves subsessile or with very short petioles, the other with the fruit sessile, but the leaves petiolated: to the first, which is the prevailing kind in Britain, and which we may term the common Oak, they give the title of *Quer. pedunculata;* to the second, which is also met with in many parts, and is frequently found growing commingled with the other kind, that of *Sessiliflora.*

Of this specific division we speak with diffidence, as it is supported by the authority of various eminent botanists, who are more competent than ourselves to determine what constitutes a species. Our own impression, however, is, that they are rather to be considered varieties than species, and this supposition, we think, is strengthened by the fact that intermediate forms,* both in regard to the position of the fruit and the form of the leaves, are frequently met with, and these are found to run so much into each other, and sometimes to partake so equally of the characters of both kinds, as to render it difficult to determine to which they show the greatest affinity, thus connecting, by gradual approaches, the two supposed species, however distinct each may appear when viewed in its typical form, or where the variation is at its maximum. We may add, that in the general form, outline, and dimensions of the two trees when arrived at maturity, no striking or marked difference is perceptible, and though the quality of the timber of the sessile-flowering kind is said to be inferior in strength and durability to that of the *pedunculated*, it is used indiscriminately with the latter by workmen for all purposes to which Oak timber is applicable, and even in ship-building the one is used in common with the other.

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* See Rev. W. T. Bree's communications and list of specimens in vol. xii. p. 571 of "Gardener's Mag." and "Arb. Brit." p. 1738.

In treating of the British Oaks, we shall, in accordance with the views of botanical authors, give the distinguishing characters of the two supposed species under their appropriate titles, with such cursory remarks as may apply to them individually, after which we shall proceed to such observations as are equally applicable to both kinds, their general and statistical history being so closely interwoven as to render any attempt at separation in this respect almost impossible.

J.W. CARMICHAEL.

Quercus (robur) pedunculata. Willd.

PEDUNCLED, OR COMMON OAK.

Quercus pedunculata,	Willd. sp. pl. No. 65.
	Loudon's Arb. Brit. part iii. ch. cv. p. 1731.
Quercus robur,	Linn. sp. pl. p. 1414.
	Smith's Br. Flor. 1026. Id. Eng. Flor. iv. p. 148.
Quercus robur pedunculatum,	Martyn's Flor. Rus. x.

Leaves deciduous, oblong, smooth, dilated upwards, sessile, or with very short petioles, the lobes obtuse, with rather acute sinuses, the stalks of the fruit elongated, acorn oblong. Such are the botanical characters assigned to the peduncled Oak, taking it in its common typical form. It is subject, nevertheless, to vary, and undergo considerable modifications in the shape of the leaves, both as regards the depth of the sinuses and the number of the lobes, as well as in the existence or total want of a petiole; the form and size of the fruit, also, are dissimilar in different trees, and the fruit-stalks vary greatly in their length; in some instances being upwards of an inch long, in others very short, and nearly sessile, or intermediate, as it were, between what may be called the typical forms of *Quer. pedunculata* and *Quer. sessiliflora*, which has induced some to consider such instances as Hybrids, though the fact of their producing fertile seeds militates, we conceive, against such a supposition, and is rather in favour of the common origin of the two supposed species. A great difference is also observable in regard to the period of coming into leaf, and casting the foliage in autumn, some trees expand-

ing much earlier than others, though growing upon the same quality of soil and within a few yards of each other,* and many remain green long after others have assumed the autumnal russet tint, or entirely lost their leaves; differences of form are also observable, some preserving a round or globular head, others a more fastigiate and upright growth; in short, innumerable variations and modifications in all the particulars above-mentioned, may be observed in Oak woods of any considerable extent. Among the different varieties of the common Oak enumerated by authors, the *Quer. fastigiata* appears one of the most distinct and remarkable, resembling, in its general form and growth, the cypress, or the Lombardy poplar, and on this account is named by the French, *Chêne cyprès*. It is a native of the Pyrenees, where it was observed by Captain Cook, now Captain Widdrington, R. N., and is also met with in the Landes near Bordeaux, and in the Basse Navarre. The Pendulous Oak, of Moccas Court, Herefordshire, is another interesting variety, and we may remark, that most of the plants raised from the acorns of the parent tree partake, in a greater or less degree, of its weeping character. There is also a laciniated or Cut-leaved Oak, another with variegated leaves, and a third with leaves tinged with purple when they first expand, enumerated among the varieties of this tree, by Loudon, in the "Arboretum Britannicum."

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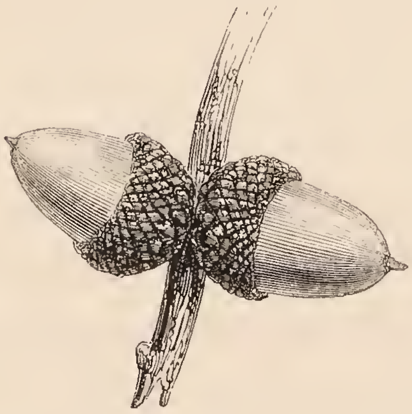
* At Twizell, there is an instance of an Oak of this kind, *Quer. pedunculata*, that invariably comes into leaf nearly three weeks earlier than any of its neighbours. The Cadenham Oak, in the New Forest, annually expands a few leaves at Christmas.

Quercus (robur) sessiliflora. Salsb.

SESSILE-FRUITED OAK.

Quercus sessiliflora,	Salsb. prod. 392.
	Smith's Flor. Brit. 1026. Id. Eng. Flor. iv. p. 150.
	Loudon's Arb. Brit. part. III. ch. cv. p. 1786.
Quercus robur,	Willd. No. 64.
Durmast Oak,	Martyn's Flor. Rus.

The distinguishing characters of this Oak, as given by Sir J. E. Smith, and other botanists, are, leaves on elongated foot-stalks, deciduous, smooth, and oblong, the sinuses opposite and rather acute, the lobes obtuse, the fruit sessile, oblong. In other respects, as to general form and magnitude, it closely resembles the common Oak, indeed so much so, that, of the numerous trees recorded in various parts of Britain, for their enormous dimensions, age, and other peculiarities, the variety or species to which they belong, has, in many cases, never been mentioned or ascertained. According to some writers, the *Quer. sessiliflora*, is said to have a more lofty and pyramidal growth than the *Quer. pedunculata ;* but this, judging from the various specimens we have examined, the characteristic drawings of Mr. Strutt, and the excellent outlines of both kinds figured in the "Arboretum Britannicum," does not appear a character upon which much dependance can be placed. Loudon states his belief that no important or constant difference exists between the mode of growth of the two kinds, "because," he observes, "we have found individuals of the one species, as pyramidal, fastigiate, or orbicular, as we have found any of the other;" and the Rev. W. T. Bree, who writes in the "Gardener's Magazine"* upon the *Quer. sessiliflora* and its varieties, remarks, that there



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* "Gardener's Magazine," vol. xii. p. 571.

is little difference in the general form and outline of the two trees when full grown, at the same time he feels "that there is a certain indescribable something about the trees, by means of which he can always distinguish each, without examining either the acorns or leaf-stalks."

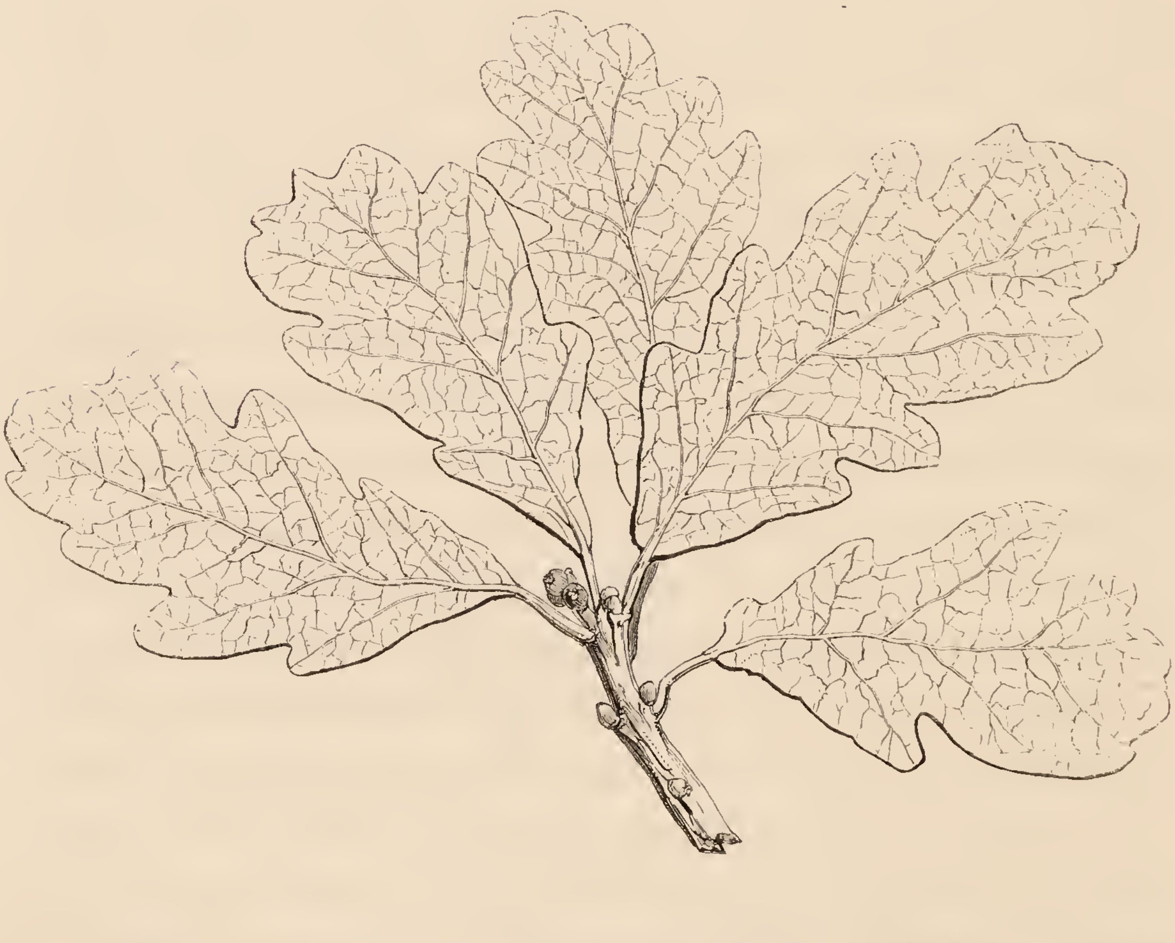
A close examination, we allow, of the two kinds, at least of trees where the peculiar characters of each are most distinctly developed, shows a difference, both in the naked tree and when clothed with leaves, that to the practised eye becomes appreciable and readily recognised; thus, we find that in *Quer. sessiliflora*, the growth of the spray, or branching, is freer and less tortuous than in *Quer. pedunculata*, that the leaf-buds are larger, and the bark in general much whiter in colour; the leaves, also, when expanded, are usually larger, and from the length of their petioles hang more loosely, and present a less tufted appearance than they do in *Quer. pedunculata.* In regard to the quality of the timber of *Quer. sessiliflora*, there are various opinions, some having considered it inferior, both in strength, toughness, and durability, to that of *Quer. pedunculata*, while others estimate their relative properties to be nearly upon a par; that the latter is the more correct opinion of the two appears to be established from the comparative trials and experiments that have been made, which show that in strength, elasticity, and toughness, the *Quer. sessiliflora* is fully equal if not superior to *Quer. pedunculata*, and were it not for the supposition of its inferior capability of withstanding the vicissitudes of dryness and moisture, that is, its more perishable nature between wind and water, it would be even superior to the *Quer. pedunculata* for ship-building.

A further proof that its wood is not generally considered of inferior quality to that of *Quer. pedunculata*, is that the timber of both kinds has always been indiscriminately used for the most important purposes, such as ship-building, house-rafters, &c., which would scarcely have been the case had the produce of *Quer. sessiliflora* been known to be, and invariably found, of a quality inferior to that of *Quer. pedunculata.* Our own opinion is, that there is not any such material difference between the qualities of the timber of the two trees as has been asserted by some, but that inferior timber is occasionally produced by each variety,—the result, perhaps, of some original constitutional defect, or arising from the nature of the soil, situation, or other local peculiarities of the ground upon which the timber has been raised. Such, at least, is the result of our own experience, as we have met with oak of the *peduncled* kind, with timber possessing all the inferior qualities attributed to and supposed to be possessed exclusively by *Quer. sessiliflora.*

The grain of the wood of *Quer. sessiliflora* is generally less varied and of a more uniform and deeper colour than that of *Quer. pedunculata,* and with less of that laminated appearance which is called the *flash* or silver grain; and it is now ascertained that the timbers found in old houses, and other ancient buildings in different parts of the kingdom, and which were long considered to be formed of the wood of the sweet chesnut, are, in reality, composed of Oak, and mostly of the sessile-fruited kind. We are only surprised how such a belief ever obtained credit, considering that the chesnut does not appear to be of indigenous growth, that at no period has it prevailed in Britain as a forest tree, and indeed does not even appear to have grown at any time in many districts where house timbers of this description have been found.

The Durmast Oak of Martyn's "Flor. Rustica," the

Quer. sessiliflora var. B. of Smith's "Eng. Flor.," and by Loudon supposed to be the *Quer. pubescens* of Willdenow's *Abbildung*, seems merely a variety of the *Quer. sessiliflora*, where the deviation from the *Quer. pedunculata* is at its maximum. In this variety the leaves are less deeply cut, more numerously sinuated, with their under surface of a pale glaucous green, and when first excluded from the bud, covered with a hoary pubescence. It is found in the New Forest, where it is known by the above-mentioned name, and is also met with in other districts, but is far less common than the usual form of *Quer. sessiliflora*. Of this well-marked variety there are two trees now growing in the grounds at Belford Hall, Northumberland, the seat of the Rev. Dixon B. Clark. From acorns gathered from these trees we have raised several plants, none of which yet resemble their parents in the appearance and colour of their foliage; but this may be



owing to their age, the largest of them not being more than six or seven years old.

We now proceed to such observations as apply to both the British Oaks, for as we have already observed, their statistics are too closely interwoven to allow of being separately treated, and what we have to say in regard to the culture, management, and properties of the one is equally applicable to the other.

The Oak is indigenous throughout Britain, and in former ages, before the clearing away of the forests had commenced, appears to have covered a very large portion of its surface, for even in districts where the natural or self-sown Oak is now rarely seen, the remains of noble and gigantic trees are frequently met with, sometimes in the alluvial deposits on the margins of our rivers, or in boggy places, covered with a layer of peat moss, which has been generated around them by the stagnation of the water caused by their fall. Examples of this kind are frequent in our own county (Northumberland), and we know of several trees of large dimensions that have been exhumed in tracts where, at the present day, scarcely an Oak of any great age, or that has attained one-fourth the size of those former denizens of the forest, is now to be met with. At Linden, the seat of Charles W. Bigge Esq., the trunk of a magnificent Oak was extracted from a peat moss, that fills a small basin or hollow, evidently produced by the stagnation of a stream which now passes through it, and which at some distant period had been dammed back by the fall of the trees upon its margins. This Oak was covered by a layer of the peat to the depth of about three feet, and was discovered by probing the moss. The trunk, with a small portion of one of the larger limbs, was with great labour and difficulty dragged from its miry bed. The contents of the portion recovered contained five hundred and forty-five cubic feet, although the whole of the sap wood had perished.

The timber was perfectly sound, and the tree, by whatever accident it had been overthrown, had fallen in the vigour of its growth. When sawn up, the interior planks were found of a deep rich brown colour; those nearer the exterior darker, or approaching to black. A variety of elegant furniture has been made from the wood, but it has been found necessary for fine cabinet-work to have it cut into veneers, as, when worked in bulk, it is apt to crack and become warped. The remains of other large Oaks have also been met with upon the banks of the Tyne, the Alne, and other rivers, as well as in various bogs and morasses, and we mention these instances to show in a district where, at the present day, nothing but recently-planted Oak, or dwarfish timber from stock shoots exists, that in former times the monarch of the forest grew luxuriantly and attained a splendid developement, and also as an inducement to the planter not to neglect the liberal insertion of this national tree wherever soil and situation are found congenial to its growth. In other parts of England the Oak still grows in all its native magnificence of form and dimensions, and the remains of those ancient forests which are chronicled by our earliest writers, and which, in the time of our Saxon ancestors, spread over the greater portion of the country, are still to be traced in the venerable but living relics of enormous Oaks, many of which are supposed to number more than a thousand years.

To give a detailed account, or even to enumerate all the various Oaks remarkable for their size and other peculiarities, which have existed or do still exist, would occupy more space than the limits of this work will allow ; this circumstance, however, we regret the less, as it may induce the reader to turn to the interesting pages of the "*Amœnitates quernæ*," of the late Professor Burnet, in which work the historical facts, legends, &c., connected with the history of individual Oaks of ancient date, are amply discussed, to the magnificent " Sylva Britannica" of Strutt, or to the " Arboretum Britannicum," in which work, the counties being ranged alphabetically, an account is given of all the most celebrated Oaks that have existed or are now living in each of them. We shall, therefore, briefly mention a few of the largest Oaks on record, and afterwards point out others which, though in a state of decay, are still living, concluding our notice with such Oaks as are in a thriving or growing state, and which promise, in progress of time, to equal the dimensions of their most magnificent predecessors.

The solid trunk of a gigantic Oak is recorded by the Rev. Abraham de la Pryme, in the " Philosophical Transactions" for 1701 ; it was found beneath the level of Hatfield chase, in Yorkshire, by Mr. Edward Canby, and measured one hundred and twenty feet in length, was thirty-six feet in circumference at the butt end, thirty feet at the middle, and eighteen feet at the small end, where the trunk was broken off, so that by moderate computation, he adds, " this tree may have been two hundred and forty feet in height." Dr. Plott, in his history of Staffordshire, mentions an Oak at Rycote, under the shadow of whose boughs four thousand three hundred and seventy-four men could stand, and another at Norbury, forty-five feet in circumference. The Boddington Oak, in Gloucestershire, the remains of which were burnt down in 1790, was fifty-four feet in circumference at the base, and Damory's Oak, in Dorsetshire, which was sold and cut up for firewood in 1755, was sixty-eight feet in circumference at the ground: both of these were hollow trees.

Of those still existing and remarkable for age and size, the Winfarthing Oak is said to have been an old tree at the time of the Conquest; Cowper's Oak, in Northamptonshire, is supposed to have been planted in the time of William the Conqueror; the Salcy Forest Oak, in the same county, boasts a much greater age, as it is supposed to have seen one thousand five hundred seasons, its trunk is forty-six feet in circumference; the Flitton Oak, in Devonshire, of the *sessiliflora* variety, supposed to be one thousand years old, is thirty-three feet in circumference at one foot from the ground; the Cowthorpe Oak, in Yorkshire, is seventy-eight feet at the ground; the Hempstead Oak, in Essex, fifty-three feet, and the Merton Oak, in Norfolk, sixty-three feet in circumference. In Scotland, also, the remains of magnificent Oaks still exist: amongst others may be particularized the Wallace Oak, at Ellerslie in Renfrewshire, amidst whose branches it is said the patriot and three hundred of his followers hid themselves from the English. At Lockwood, in Annandale, Dumfriesshire, the ancient seat of the Johnston family, we visited, about three years ago, the grove of Oaks which surrounds the remains of the ancient castle, and remarked one of still vigorous growth, with a circumference, a little above the ground, of sixteen feet. In the same county, during the tremendous hurricane of the 7th of January, 1839, a remarkable Oak called "the three brothers," so named from the three stems or limbs of which it was composed, was blown down, the solid contents of which were found to be five hundred and sixty-one feet eight inches.

In Roxburghshire, near Jedburgh, stands the King of the Woods, a beautiful Oak of vigorous growth, with a trunk forty-three feet in height, and a circumference of upwards of sixteen feet, and near to it the Capon tree, figured above, a short-stemmed but very wide-spreading Oak, with a circumference at the base of twenty-four feet, the legend attached to which is, that it served as a trysting place for the border clans in bygone times. These two trees are supposed to be the remains of the ancient forest of Jed. In Inverness-shire, at the head of Loch Gary, Sir T. Dick Lauder* found the remains of a prostrate Oak forest upon the surface of the solid ground, among which he measured one tree with a clean stem twenty-three feet in length, sixteen feet in circumference at the butt end, and eleven feet towards the smaller end under the fork; the wood, with the exception of an inch or two on the external part, appeared perfectly fresh, although it must have lain for many years in that situation, as a fine old birch wood grew upon the ground it had occupied; Sir T. D. Lauder adds, that the stock whereon this Oak had grown and close to which it lay, was worn away in the centre, and so hollowed out as to encircle a large and thriving self-sown birch tree of more than a foot in diameter.

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* Lauder's "Gilpin," p. 272.

Of Oaks, still in vigorous health and increasing in size, the Squitch bank Oak, in Bagot Park, Staffordshire, the seat of Lord Bagot, seems one of the largest, being upwards of forty-three feet in circumference at the base, and sixty-one feet high; its solid contents, a few years ago, were found to exceed one thousand and twelve feet. The Beggars' Oak, in the same Park, is also a fresh and vigorous tree, with a trunk upwards of twenty-seven feet in circumference at five feet from the ground; it contains eight hundred and seventy-seven cubic feet of timber, and Sir T. D. Lauder informs us would have produced, according to the price offered for it in 1812, 202*l.* 14*s.* 9*d.* At Hazelgrove, in Somersetshire, is a noble Oak, eighty feet in height, and which measures thirty feet in circumference at four feet from the ground; this tree contains eight hundred and sixty-three feet of timber. At Nettlecombe Court, in the same county, is another Oak, eighty-five feet high, seventeen in circumference near the ground, and which contains six hundred cubic feet of timber. The Woolton Oak, Buckinghamshire, possesses all the characteristics of a magnificent and picturesque tree, and by some is considered one of the finest in England, even surpassing, in characteristic beauty, the Chandos Oak, which grows in the same county, in the grounds of Michenden House; this tree is now in the highest health and vigour, and its wide-spreading, umbrageous head covers a circle whose diameter is more than one hundred and eighteen feet. The great Panshanger Oak, in Herts, is another magnificent tree, of great beauty, and well balanced form, and though upwards of one hundred and fifty years old, is only approaching its prime; when last measured, it was found to contain more than one thousand feet of solid timber.

Innumerable other thriving specimens of Oaks might be instanced in various parts of the kingdom, as scarce a park exists that does not boast of vigorous trees, in different stages of growth, many of them promising to equal the finest specimens of recorded British Oaks, and which, there is little doubt, if allowed to attain their utmost longevity, will, at some far distant day, emulate the gigantic remains of those we now survey with admiration and astonishment.

At Hedgeley, in Northumberland, we lately saw an Oak thirty-seven years old, that had attained a circumference of five feet six inches about a foot above the ground. It is the produce of an acorn planted in the place where the tree stands.

During the Saxon rule and even for some time after the Conquest, Oak forests were chiefly valued for the fattening of swine, and in times of scarcity, acorns were not disdained as human food. Laws relating to pannage, or the fattening of hogs in the forest, were enacted during the heptarchy; and by King Ina's statutes, any person wantonly injuring or destroying an Oak tree, was mulcted in a fine, varying in extent according to its size, or the quantity of mast it produced, and we may further judge of the value attached, in those days, to this kind of produce, when we find that the pannage of two hundred hogs was deemed a fit portion for a princess, and that donations of monarchs to their retainers often consisted of the produce of a portion of Oak forest.

The durability and fitness of the Oak for naval purposes seems to have been appreciated from a very early period, and long before any records we possess, for in the "Journal of Science" (vol. i. p. 244) Sir Joseph Banks mentions the finding of an ancient canoe in Lincolnshire, in April 1816, at a depth of eight feet below the surface, when cutting a drain parallel with the river Witham, about two miles east of Lincoln,—it was hollowed out of an Oak tree, and measured thirty feet eight inches in length, and three broad in the widest part; several other canoes of a similar construction have been discovered in the same county and near to the same locality, and as vessels of a much superior build were in use, long before the time of Alfred, a very ancient, and in all likelihood a date anterior to the invasion of the Romans, may pretty confidently be assigned to these primitive vessels which, as Professor Burnet observes, "are only found amongst the rudest people and in the earliest stages of society." In the time of the Saxons, their numerous ships, or rather oared galleys, were built of Oak; and after the Conquest, the British navy was fostered with great care, and as early as A. D. 1214, in the reign of King John, the right of England to the dominion of the seas was proclaimed. It was not, however, till the time of Henry the Seventh that three-masted vessels, or ships approaching in magnitude and form to our present men-of-war, were built, although cannon had been used aboard ships as early as 1380.

Oak timber was also used almost exclusively for all building and carpentry purposes; the timbers of the oldest buildings are uniformly of Oak; it formed the roofing, as well as the interior decorations, of our ancient churches and cathedrals, as we see it exhibited in the beautiful tabernacled stalls of that of Gloucester, in the shrine of Edward the Confessor in Westminster Abbey, and in various other ancient edifices. It roofed our old baronial castles and halls, and also panelled their rooms of entertainment; and the massive tables and other household furniture with which they were provided, were generally fabricated of the same durable material. It was also used from the earliest period in all exterior works where strength and durability were required, such as piles to strengthen and secure foundations of buildings, bridges, &c.; and its durability and almost imperishable nature for water-works is proved by the sound condition, in which it has been found after the lapse of ages, in one instance, viz., that of the stakes driven into the bed of the Thames to prevent the approach and landing of Julius Cæsar, of nearly two thousand years.

The decrease of the Oak forests in Britain was, for long after the Conquest, very gradual, as in Henry the Second's time the greater part of England appears to have been covered with wood, consisting principally of Oak, and about that period London was surrounded by a large forest, "in the coverts whereof (so says Fitzstephen) lurked bucks and does, wild boars, and bulls;" and even so late as the reign of Henry the Seventh, Polydore Virgil informs us that the forests covered nearly one third of all England. It appears, however, soon after this period, in consequence, we may presume, of the increasing population, the advance of civilisation, and the greater demand for agricultural produce, and perhaps, also, by a partial relaxation of the severe forest laws in regard to the preservation of game, the axe, and other means of destruction must have been freely applied, as it was deemed necessary, in the reign of his successor, to enact a law enjoining the replantation of forest-trees, and in the 13th of Elizabeth further enactments were required for the preservation of the royal woods. These suffered again most severely during the civil wars, and so great was the destruction of the Oak, during these unsettled times, that serious apprehensions of a failure of timber for the support of the navy, began to be entertained in the succeeding reigns; and in that of William the Third a statute was passed, empowering commissioners to enclose at once two thousand acres of the New Forest, and to add annually two hundred more for the space of twenty years; since then, the national woods have been more strictly looked after, and a breadth of land to the extent, we believe, of fifty thousand acres, is now planted, and as an improved system of management has been adopted, we may hope that it will to a certain extent answer the intentions proposed by the legislature.

It is not, however, to the royal forests we are to look for the principal supply of our naval timber, but to the encouragement given to planting by the remuneration private proprietors reap from the cultivation of the Oak;* and though its value may be lessened, as compared with what it produced during the period of the late war, when Oak bark had risen to an enormous price, in some years having amounted to fourteen, sixteen, and even eighteen pounds per ton, still the present price of Oak timber, for ship-building, and for which the demand seems annually increasing, is sufficiently encouraging, (low as now may be the comparative value of the bark,) to induce any one who plants to introduce a due proportion of this valuable tree.

There may, perhaps, be some who suppose, from the slower growth of the Oak, and the length of time it requires to attain maturity and size to qualify it for ship-timber, that they are likely to gain more and within a shorter period, by plantations composed of other trees without any admixture of Oak. Such an opinion we conceive to be erroneous, at least with respect to all soils in which this tree will thrive, for we believe that greater advantages and equal profit may be obtained from mixed plantations, in which the Oak has been introduced in sufficient quantity to stand as an ultimate crop, for the number of plants required for this purpose, and the room they occupy when quite young and for many years afterwards, is not such as to lessen materially the value of the necessary and periodical thinnings of the other occupants which have been planted as nurses or rather secondaries, and, after these are all cut out, a crop of valuable wood is left, which, although it may not arrive at maturity during the planter's life, greatly adds to the value of his property. But the Oak, though it requires a greater length of time to render it fit for naval and other purposes requiring a large scantling and sound heart-wood than our other forest-trees, is not of so slow a growth as many seem inclined to suppose, for it is found that its rate of increase, when planted in favourable soil and situation, and after it is once fairly established, is from one inch to one inch and three quarters in circumference annually, for nearly the first century, and that it has frequently been known to contain a ton of timber at the age of seventy; after this period, and until it attains its full maturity, or begins to decay, its annual increase in circumference is not so great, though its solid contents may be increasing faster, inasmuch as the square enlarges more rapidly by a smaller addition to the increasing diameter.

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* Ten Oak trees were sold by Sir George Cornwale, Worcestershire, for 1100*l*.

As compared with the larch, the Scotch fir, and others of the pine tribe, or with the rapid-growing poplars and willows, the growth of the Oak during youth is undoubtedly much slower, being only at one third the rate of that of the white poplar, and even less of that of the black Italian poplar; the difference, however, in respect to the ash, the elm, the beech, and some other forest-trees, is not nearly so great, as we find from Vancouver's observations in Hampshire that the relative increase of various trees in that county, taking them at ten years old, and fixing the Oak as a standard, was as follows; Oak ten, Elm sixteen, Ash eighteen, and Beech twenty. In our own plantations, which are of considerable extent, and upon which great care and attention has been bestowed in regard to timely thinning, &c., the difference in the rate of growth of the Oak, in respect to the ash, wych elm, sycamore, beech, &c., is not so great as above stated; indeed in some parts where the soil is particularly suitable to the Oak, now that the trees have attained the age of twenty-eight or thirty years, it is very trifling, and scarcely perceptible, and we find that at this age, in consequence of having planted the Oak in a larger proportion per acre than can stand permanently, the thinnings of this tree pay better than those of any other occupant except the larch, as they are of size sufficient to cut up into staves and other purposes to which the thinnings of the other kinds of hard wood at this age are applied, at the same time that the value of the bark, even at its present reduced price, more than repays the whole cost of cutting down and converting to use.

At twenty-eight years' growth we have several Oaks three feet in circumference at eighteen inches from the ground, a great number two feet four inches, and the average of the remainder from sixteen to eighteen inches; within the same period, the growth of the larch, taking the medium size, is three feet nine inches at eighteen inches above the ground, the spruce fir nearly four feet, the Scotch fir three feet eight inches, the wych elm from two feet seven inches to three feet, the beech from two feet nine inches to three feet, the sycamore from two feet six inches to three feet, the black Italian poplar of twenty-two and twenty-four years old upwards of five feet, the *Salix alba* nearly the same.

Although the Oak will grow in a great variety of soils, and produces valuable timber upon such as seem of very opposite quality, it is generally acknowledged and allowed that it flourishes in the greatest perfection, and produces the best timber upon such as are of a strong adhesive nature, or are known under the term of clayey loams, or good clay soils, more particularly where the substratum is of this description, and of considerable depth, for as it sends down its roots much deeper than most other forest-trees, it derives its chief nutriment from the lower strata, and is not dependent as they are upon the nature of the surface soil. On this account we must not judge of the fitness of the soil for the growth of Oak, by the appearance or quality of the upper stratum, for it frequently happens that extensive districts, where the surface soil is of so poor and inferior a quality as scarcely to repay the cost of cultivation, are nevertheless, from their strong clayey substrata, well adapted to the growth of Oak: such is the case upon many moorish tracts and wastes, where a poor thin surface soil is succeeded by a deep stiff loam, or where the surface is of a poor tilly and gravelly nature, but with a strong clayey substratum. Upon the cold clayey tracts of the north of England and Scotland, which unless subjected to the process of furrow draining, are scarce worth cultivating, the Oak grows vigorously, and with every promise of obtaining a valuable scantling; we have Oaks growing upon land of this description, which look as healthy and promise as fairly, as almost any we have planted upon what we consider the best of our woodland soil, and we can form some opinion of what the nature of the timber is likely to be when matured by age, from the quality and quantity of sound heartwood the thinnings now show at the age of thirty years.

In preparing clay lands of this description for planting, the great object is to get them effectually surface-drained, so that after heavy drenching rains the superabundant moisture may be rapidly carried off, and not allowed to stagnate, and thus sour the ground, reducing it in wet seasons to the state of mortar, and afterwards leaving it, when desiccated by long-continued drought, as hard and impervious as a half-burnt brick. This must be effected by numerous open cuts, taking advantage of the hang or fall of the ground, and so disposed as to discharge their contents into one or more main drains, to carry the water entirely off; these open drains ought to be two spadings deep, about three feet wide at the top, and shelving gradually to the bottom, the cost of casting out which may amount to 2*d.* per rood.

We speak from experience of the advantage, indeed the necessity of effectually surface-draining land of this description previously to the insertion of the trees, for having planted about eight acres of a stiff clayey soil, with little fall but with no appearance of springs or bottom water, we found at the end of four years that the plants had scarcely made any progress, indeed that many had died, their roots having perished, either from the constant saturation of the earth during long-continued rains, or else from having been desiccated and bound up in an impenetrable brick-like mass by the spring and summer droughts. In the autumn of the fifth year we had this plantation thoroughly intersected by open drains, and at the end of the succeeding summer the effect was visible and striking; the whole of the plants which, during the previous year, had presented a sickly, dying aspect, had already, in most instances, made tolerable shoots, and had acquired a healthy colour, at the same time that the soil had become loose and friable, and the surface which previously presented nothing to the eye but patches of *carex recurva*, and a few scattered tufts of *lotus corniculatus*, had become thickly covered with herbage. Up to the present time, now three years since the drains were cut, the progress of the trees has been as rapid as we could wish or expect, and the earth is now loose and friable, and of a texture very dissimilar to what it exhibited when saturated with moisture and undrained.

The Oak is propagated entirely by acorns, which are either sown at once in the place where the plants are to remain, or else in nurseries where, after being transplanted from the seed-beds, they are allowed to stand for two or three years, or until they acquire sufficient size and strength to suit the views of different purchasers. Each mode of propagation has its advocates and admirers, and much has been said and written by both parties in favour and defence of their respective opinions. The acorn planter pleads for his system that it appears to be more in accordance with the common course of nature, at the same time imagining that the preservation of the early tap root of the seedling is essential to the future developement of the tree; on the contrary, the favourer of the plant system is satisfied that the cutting off the lower portion of the tap root at an early age, neither greatly retards the growth nor interferes in the slightest degree with the after developement of the plant, added to which he maintains this important consideration, that an Oak wood may be raised by the plant system at much less cost, and with greater certainty of success than by the former method.

After having made trial of both modes of propagation, and watched the progress of the Oak under each system for the last thirty years, we have no hesitation in giving a decided preference to plants over acorns, being convinced in planting upon an extensive scale, and where rapid growth and profit are the principal objects in view, that Oak woods may be raised by the plant system at less cost, and with a greater certainty of producing eventually, timber of as large a scantling and as excellent in quality, as by sowing the acorns where the trees are to stand.

The supposition that cutting off any portion of the tap root of the young Oak must be prejudicial to its growth, or that the tree continues to draw its chief support and nourishment during the many centuries it exists, through its medium, are both of them equally erroneous. It is a well-known fact that in seedling Oaks and other tap-rooted trees, the loss of the lower portion that may be cut off is soon supplied by the reproduction of one or more downward leading roots, as well as that the emission of the lateral roots which, after a limited time, or as soon as they have taken firm hold of the ground, undertake the duty of support, is thereby encouraged; and as Mr. Loudon observes, " it is also well-known that the tap root is only found in the Oak and other trees when in a young state,[*] and that no Oak or other tree, when cut down or uprooted, was ever found to have anything like a perpendicular descending main root, in any way commensurate to the perpendicularly ascending trunk of the tree, above ground."

The tap root of the young Oak, like that of the walnut, and many other trees, only supports the plant during infancy, or for a limited time, which may vary according to the circumstances of soil, situation, and climate, but so soon as the lateral roots are emitted, and become large enough to undertake the support of the tree, from that time Mr. Davis, whose observations on this subject are well worth perusal,[†] remarks, "the tap root ceases to be useful and at no distant period ceases to increase, and is very soon not distinguishable from the other roots:" he afterwards arrives at the conclusion, "that not only will an Oak sapling or seedling from three to five years old, planted out with the tap root cut off, again root downwards, sometimes singly, sometimes forked," but that the practice of cutting off the tap root gives the plant new vigour, and enables it after a few years to exceed in growth the native tree, and further that large Oak trees, whether native or transplanted, long before they become fit for naval or other purposes, lose their tap roots altogether.

But, supposing the advantages, in respect to early growth, increased scantling, &c., of the two modes of propagation to be upon a par, or even somewhat in favour of the native plant, still we hold that in extensive planting operations, more particularly in the north of England and Scotland, the cost of the acorn system would considerably exceed that where plants are used, and without ensuring the same certainty of success of a requisite number of trees; for, it must not be forgotten, that nearly the same labour and expence would be required to prepare the holes for the reception of the acorns, as would suffice to plant young trees by pitting, and much more, where this is effected by slitting in, a mode of planting that may be successfully used with small-sized plants, and which we would recommend where the soil is of a clayey retentive nature; but the expence of the acorn system does not end with the mere committal of the seed to the earth, the seedlings must be inspected and taken care of for two or three years afterwards, kept clean of weeds, and the supernumeraries thinned out, all of which operations are attended with considerable expence; added to this, it often happens that the greater part of the seed sown fails to vegetate, or is destroyed by vermin,* or other casualties, in which case, a similar expence for seed, planting, &c., must again be incurred, and, what is of still greater importance to the planter, the loss of the growth of several years. Acorns, also, it must be recollected, though frequently to be procured in plenty and at a cheap rate in many of the southern and midland counties, are costly in comparison when imported into the north of England and Scotland, and, as the crop is uncertain, they cannot be procured every season, whereas the nurseries are rarely without an abundant supply of young trees.

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[*] This is the case with several of the pine tribe, which when quite young have large tap roots, as any one may ascertain by examining seedlings of the pinaster, and stone-pines. These cease to elongate as soon as the lateral roots which, in most species run near the surface, acquire sufficient size to nourish the tree and have taken firm hold of the ground.

[†] "Bath Soc. Papers," vol. xv. p. 51.

By the plant system, where common attention is paid to the operation, a regular crop of young trees, disposed at such distances as may suit the fancy and views of each respective planter, is at once secured, with the additional advantage of gaining from three to five years in advance of native plants, for, even should it be thought advantageous, as many do, to cut close over by the surface all such trees as at the end of the first or second season after insertion have made little or no progress, or which look stunted and unseemly in growth, still the shoot that they rarely fail to make after this operation, would, in almost every case, exceed the growth of a native plant of three or four years old, and the advantage would remain with the planted tree.

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* See Billington's Planting, from page 37 to page 47.

The benefit of trenching * and manuring the ground previously to planting has been much insisted on and strongly recommended in various treatises on arboriculture and planting; we think, however, that those who speak so highly in its favour and recommend its general adoption have been premature in their conclusions, and we fully agree in the opinion expressed by Mr. Matthew in his able treatise on naval timber, that, had they waited the result of twenty-eight or thirty years' growth, their conclusions as to its ultimate advantage would have been very different from those drawn from the state of plants, as exhibited in trenched ground, of eight or ten years' growth. Such also is the inference we draw from our own experience, and, as we have tested the system upon a tolerably extensive scale, and also watched its progress and effect in other instances, we venture to speak with some degree of confidence upon the subject.

About thirty years ago, an extent of about sixty acres around the mansion at Twizell was planted in one season, and, as a new approach was made to run through it, a strip of this ground, about thirty yards in width on each

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* See Wither's Pamphlet.

side of the new road and nearly a quarter of a mile in length, was deeply trenched,* and a small portion manured in addition.

The rest of the ground, adjoining the strip on each side, was planted in the usual manner, either by pitting or slitting, as seemed to suit the nature of the soil, a large proportion being a strong loamy clay, the remainder of a lighter nature with a mixture of gravel. The trees planted consisted of Oak, beech, wych elm, sycamore, and larch, with a sprinkling of silver, spruce, and Scotch firs. Six years after planting, the trees in the trenched ground seemed fully established, having, from the second season after they were put in, made long and vigorous shoots, and had reached a considerable size, while those in the untrenched part seemed at that age to be only recovering from the effects of transplantation, or just beginning to push freely away; at twelve years old, the plants in the trenched ground still continued to grow rapidly and luxuriantly, and were far ahead of their neighbours, but the latter had now begun to push vigorously, and to make strong and lengthy shoots; at fifteen or sixteen, the shoots of the trees in the trenched parts began visibly to decrease in length and vigour, in consequence, we may suppose, of the rapid exhaustion of the trenched soil, and the descent of the roots to the unmoved stratum below, which gave, as it appeared, a sudden check to their previously rampant growth; no check of this kind took place with the other trees, as they continued to advance steadily and rapidly every season; at the end of twenty years, though the trees in the trenched parts continued healthy, the annual growth of those in the untrenched ground had, for the last four or five years, exceeded theirs, and the difference in height and size, so marked at an earlier period, was now rapidly decreasing, and in the course of four or five years more, was not observable ; since then, or up to the present time, an interval of four years, their respective progress has been nearly on a par, though we think we can discern a slight advantage in favour of those in the untrenched ground; so that, from this experiment, it would appear that in less than thirty years, all apparent advantages from trenching had disappeared, and, we may add, that, in various other instances, where we have been enabled to institute a comparison between the growth of plantations on trenched and untrenched ground, the result has invariably been the same, nor have we been able to discover any marked distinction even where high manuring has been added to the trenching, its effects appearing to be merely temporary, and not of permanent advantage to the tree.

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* The cost of trenching at that period was 10*l.* per acre.

But, even allowing all the advantages as to rapid growth, &c., attributed to trenching by its advocates and admirers, to be true, the cost alone attending the operation must always prevent its adoption upon an extended scale, and, where profit is looked to, it is entirely out of the question, as we feel assured that no growth, however extraordinary, would ever repay the enormous expence incurred in raising timber upon this system, without taking into consideration that a vast proportion of land, well adapted for planting and the growth of timber, could not possibly, from the nature of its surface, be subjected to this operation. Trenching, therefore, may be considered not only an expensive and unprofitable preparation for growing timber, but as money thrown away, inasmuch as it is attended by no beneficial result, neither accelerating maturity, nor adding to the value and quality of the timber when matured.

In forming mixed plantations, where the Oak is introduced, and where it is intended to stand for timber after the other occupants have been removed or thinned out, great attention is necessary in selecting the kinds best adapted for nurses, or as intermediate occupants, and at the same time suited to the soil upon which the plantation is meant to be raised.

In the north of England and in Scotland, where, within the last forty or fifty years, a large extent of surface has been appropriated to the raising of timber, a great error has very generally been committed, in introducing, in too large a proportion, the wych elm, the ash, and the beech, with the oak, as the habit and growth of these species render them peculiarly inimical to the progress of this tree, which bears interference with less patience, and suffers more from close contact, than almost any other; the first, indeed, we think, ought to be almost entirely excluded* from mixed plantations, as it is certain, from its rampant growth for the first few years after being planted, from its wide-spreading head, and the fanlike form of its branches, to overtop, lash, and injure every other species around it, add to which, that it is only upon land of superior quality that it attains a large and valuable size, as it almost invariably becomes stunted and unhealthy upon clayey soils, however rapidly it may grow for the first eight or ten years, during which period it seldom fails to do serious injury to its neighbours, and particularly to the slower-growing Oak.

The ash, also, when it attains a considerable height, becomes a most injurious neighbour to the Oak, for, being drawn up with a long straight stem, of nearly the same diameter throughout the greater part of its length, and terminating in a spreading heavy head, it is easily swayed by the wind, and, from the formidable nature of its strong unbending spray, is certain to do serious injury to every tree that stands within its sweep. The beech, also, from its wide-spreading head, is unfit to plant with the Oak, added to which, its timber when young is of very trifling value.

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* In low and rich bottom ground it might perhaps be planted with the ash.

Trees of a pyramidal growth are those best adapted to plant with the Oak, as they do not interfere with the head growth of this important tree; it is therefore that the larch, the Scotch and the spruce fir are so well suited to act as nurses or secondaries to the Oak, their rapid growth affording a kindly warmth and shelter, at the same time that sufficient head room is allowed to the trees they are meant to foster and protect.

Of the deciduous or hard-wood trees best suited to mix with the Oak, we consider the wild cherry or gean, the sycamore, and the birch as holding the most prominent station, the two first from their pyramidal form during the first twenty or thirty years of their growth, their stiff unbending spray, not easily moved or swayed by the wind; the birch, from its upright and fastigiate growth and its very slender spray, which, though liable to be moved, is of too delicate a texture to injure the more robust and thicker shoots of the Oak. The sweet chesnut, also, and the Cerris Oak may be profitably introduced in suitable soils, as neither of these trees, from their habit, are likely to be injurious to the Oak, and as their timber becomes very valuable at the age of thirty or forty years they are well calculated for secondaries or intermediate occupants. The larch, however, in all districts where it will grow is the tree we would recommend to be planted in the largest proportion with the Oak, being, even as a mere nurse plant, superior to any of the other firs, as, at the same time that it affords sufficient shelter, it admits, from the nature as well as the deciduous character of its foliage, more light and air at all seasons than they do; it also occupies less room, grows as rapidly, and its thinnings are valuable, even from the size of a hedge stake.

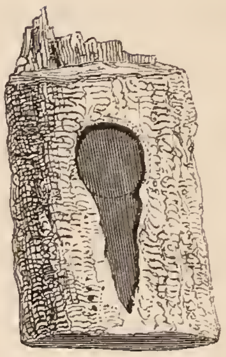
We shall now proceed to make a few observations upon the combinations, or assortment of trees we think best adapted to plant with the Oak, upon soils of various qualities, taking climate and situation also into consideration. Upon land of good quality and loamy nature and tolerably sheltered the following combinations are recommended, and, taking the number of trees to be planted upon each acre at 3000, that is, at rather more than three feet and a half apart, they may be proportioned as follows: first combination, larch 1000, firs Scotch and spruce 400, the spruce for the damper spots, and where the surface soil is light, Oak 600, cherry 600, sycamore 400; a second combination might consist of larch 1200, Oak 600, cherry 300, sweet chesnut 300, Cerris Oak 200, firs 400; a third combination, larch 1500, Oak 600, sweet chesnut and Cerris Oak 400, cherry 250, sycamore or birch 250. Should the 3000 trees per acre, upon this superior soil, be thought too great a number, then the different species may be reduced proportionately to the numbers above given.

On soils of a stiffer or clayey staple, and in upland or more exposed districts, the combination might be first, larch 1000, firs 500, Oak 500, cherry 200, Cerris Oak, chesnut, or sycamore 300, birch 500; or, second combination, larch 1000, firs 600, Oak 600, cherry 300, sycamore and birch 500. In exposed and open districts, where the surface soil is thin and poor, but where the substratum is of a strong argillaceous nature and capable of bearing Oak, the following combination may be adopted, larch 1200, firs 600, Oak 600, birch 600; or, second combination, larch 1200, firs 800, Oak 400, birch 600.

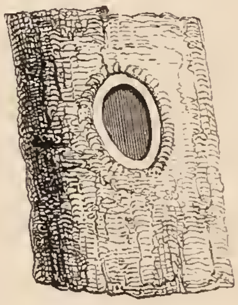
The Oak is generally planted by the pitting method, and the pits should be made two or three months before the plants are put in, in order that the earth thrown out may become loose and friable by exposure to the atmospheric air; this is certainly the best method upon all soils where superabundant moisture can readily escape, as plants of a larger size can be used, and sufficient room given to the large and lengthy tap root, without cutting off so large a portion of the lower part of it as is frequently done by ignorant workmen to facilitate its insertion in the ground. In stiff retentive clays, however, we prefer the slitting system, using plants of rather smaller size; the great advantage attending this mode of planting is, that no reservoir is formed for any quantity of water to stagnate around, and corrupt the roots, which frequently happens where pitting has been pursued upon stiff retentive soils.

Two years after planting, the Oaks should be carefully inspected, and every plant that seems stunted or of unseemly figure, cut over close by the ground; this operation gives an immediate stimulus to the root below, and it rarely fails to throw up a strong straight shoot, in most instances taller than the original stock that had been cut away. Subsequently the Oak requires very little pruning, and the knife ought rarely to be used except to remove a supernumerary leader, or to shorten a side branch of too rampant a growth, and this ought only to be done whilst the tree is young, and always in summer, or after the expansion of the leaves.

The excision of large branches of the Oak close by



the stem we have always found attended by injurious effects, but to a much greater extent when performed during the dormant or winter season than when the tree was in leaf, and its vitality in full action. If performed during the first-named period, in addition to a rapid taint or incipient decay of the surface of the wound, we have generally observed that the bark at its lower angle lost its vitality and began to decay, thus enlarging the wound to a considerable extent downwards, as shown in the figure, and exposing in addition to the space occupied by the branch, a large surface of the stem to the action of the air and moisture.



This, however, rarely takes place in a healthy tree when the branch is taken off during summer, or immediately after the tree has expanded its leaves, for its vital functions are then in full activity, and it has already begun to elaborate and deposit its layer of alburnum or young wood which immediately begins to form around the edges of the wound as shown in the figure, (where the white ring represents the recently-deposited wood,) and, continuing to advance upon it, has generally by the end of summer so far covered it as to protect the lower angle from the effects of cold and moisture.

But the Oak in mixed plantations, or grown in mass, does not require the artificial pruning that Pontey and others have advocated, to give it length and cleanness of stem, to qualify it when mature for plank timber; in such situations it must necessarily make every effort to keep pace with the growth of the other trees around to secure its portion of light and air ; its growth is therefore for many years principally confined to the elongation of the trunk or main stem ; this, together with the confined space to which it is restricted, prevents the vigorous growth and great enlargement of the lateral branches, which always takes place in single trees, or where they have space and air. Indeed the difficulty is to induce the Oak in plantations to retain lateral branches sufficient to maintain and support it in vigorous health, and this can only be effected by oft-repeated thinnings to admit of sufficient light and air, and prevent too close an interference of other trees with its growth and head room ; for how often do mixed plantations meet the eye wherein the unfortunate Oaks, from want of air and timely thinning, are drawn up to long consumptive-looking poles, entirely divested of their lateral branches, or as it were deprived of a portion of their lungs, and barely kept in a lingering state of existence by the few top-most shoots, that in the struggle for life have forced their way to the light.

At Twizell, where thinning has been freely administered and carefully attended to, the Oaks in plantations of about thirty years old have run up with fine straight stems, many of them full thirty feet in length, and still carrying an upright leader. All these, however, still retain a portion of their lateral branches, which assist so essentially in the important functions of conducting and elaborating the sap, and without which the deposition of the woody fibre cannot be effected to the extent necessary to the health and vigour of the tree ; these laterals, we expect, will retain their vitality so long as the trees require and are benefited by their presence, their removal or decay only taking place gradually, or as the upper branches which are to form the future head of the tree become enlarged, and are able to take upon themselves the entire support of the lower portion of their trunks.

Upon single trees, or where the Oak stands free and unencumbered, the pruning knife must be used with the greatest caution, and only at an early stage of growth, when it may be necessary to remove a second leader, or to curtail a side branch that threatens to interfere with the form and destroy the balance of the plant; for being naturally a wide-spreading tree, the lopping of the side branches in order to give length of stem, as directed and recommended by some writers, is certain not only to destroy its characteristic beauty and grandeur of form, but to prove most injurious to its growth, as the tree is thereby deprived of those very members upon which its health and vigour mainly depend, not to mention the risk of producing early decay by taint received through the medium of the wounds caused by the excision of the branches.

Timber for naval purposes, we must also bear in mind, is not confined to planking, or that portion of the tree produced by a long straight trunk; the knees and bends formed by the angles the side branches and limbs make with the main stem of the tree, are also of paramount importance in naval architecture, and these are always procured in the greatest perfection from trees that have grown in their natural and expansive form, and hence it is that hedge-row Oak in general affords so large a supply of this valuable denomination of timber.

By some of our arboricultural authors, hints have been thrown out and schemes proposed to obtain by artificial means the various bends and angles required in ship-timber; but however ingenious some of these plans may be, we do not think the system can be profitably pursued upon an extensive scale; besides, it is now the less necessary, as by the application of steam and mechanical means, timber can be bent and brought to almost any form required. Among the various devices proposed, we think those of Mr. Matthew best calculated to produce the effect intended, and to his observations on this subject contained in his able treatise on naval timber, &c., we refer our readers.

In some parts of Scotland, and particularly in the highland districts, as well as in the west and north of England, Oak coppice wood prevails to a considerable extent; this copse is the produce of the old stocks or stoves of former Oak trees, or of such as have been planted for the express purpose, and is cut over at various periods between the ages of fifteen and thirty years, or according to the rapidity of its growth, which depends greatly upon soil and climate, as the shoots which, in the south of England, and upon good soil attain a diameter of from four to six inches in fifteen years, would, in the colder climate of Scotland require twenty-five years or more to reach the same dimensions.

To the system of Oak coppice wood we are decidedly opposed, and we most cordially agree in Mr. Matthew's recommendation to the holders of such property, that "they should immediately set about converting their coppice hags into Oak forest, either by careful thinning and selection," or by rooting out the old stoves, and replanting the ground with Oak and other trees: no diminution or loss of income, we are confident, would follow such a change; on the contrary, we believe that the return from such woods thus replanted, would be greater even within the first thirty years of their growth than can now be realized from coppice, to say nothing of the constantly increasing return they would make after this period for a long series of years, or of the value of the crop of Oak that might eventually be left to reach maturity or a scantling fit for naval and building purposes.

The principal inducement that some years ago existed, to retain and cultivate copse wood Oak, is now greatly diminished, for the bark, which constitutes the chief value of coppice, as may be collected from the statements of the author of the "Forester's Guide," the great advocate of this system, which, during the war period, produced upwards of fourteen pounds per ton, having now fallen to less than half that price, the wood is, from its small size, of little importance and value, and the greater part cut in Scotland is either cut up into spokes for carriage wheels, converted into charcoal, or distilled for the pyroligneous acid it contains, which latter product is extensively used in calico printing and bleaching operations.

To procure the valuable bark of the Oak* the operation of felling must be performed in the spring, when the sap is sufficiently up to allow of its being easily stripped from the tree; by some it has been supposed that cutting at this season must be injurious to the timber, but this, from the observations and experiments that have been made, does not appear to be the case, and it is found that the heart-wood of Oak cut down in the full run of the sap, is equally as durable as that felled in winter, or in the decline of the year, as well as of trees that have been barked and allowed to stand a year or two in that state previously to being cut down.

In all cases the white or sap wood of Oak is equally liable to perish and moulder away when exposed to the alternation of dryness and moisture, and no treatment has hitherto been discovered* (unless Kyan's solution should prove to be so) to render it as durable as the deeper-coloured heart-wood.

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* The bark alone of the great Gelonos Oak, felled in Monmouthshire in 1810, is said to have sold for 200*l.*; this tree eventually produced 675*l.*

In respect to the age at which the Oak ought to be felled, to produce the greatest profit, that must in a great measure depend upon soil and climate, as well as upon the demand for Oak timber of this or that description and quality in each respective neighbourhood; it may, however, Loudon observes, be taken as a rule, that whenever a tree has reached that period of its growth, that the annual increase does not amount in value to the interest of the money which, at the time, the tree would produce if felled, then is the most profitable time to take it down. For ship timber, Oak of ninety years growth, in the most favourable situations as to soil, &c., such as the weald of Kent, is considered by Mr. Larkin,† an eminent purveyor of naval timber, as the most profitable age for cutting, for although larger scantlings are produced at one hundred and thirty years growth, the increase in the forty additional years will scarcely pay two per cent.

As a hedge-row tree, the Oak is generally allowed to be superior to any other, producing, in this situation, not only the most valuable timber and the thickest bark, but interfering less, from the downward direction of its roots, with the tillage of the ground in its immediate vicinity; its shade and drip also are less injurious to the undergrowth beneath, than that of any other tree except, as Mr. Matthew observes, the apple and the pear. It is also, in an ornamental point of view, one of the most desirable, from the effect its form and varied outline, as well as its rich and clustering foliage, produce in the general scenery of a cultivated district.

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* We have since been informed that, in Gloucestershire, white or sapwood Oak is rendered durable by immersion in water for six or eight months, previously to its being cut up for use.

† "Gardener's Mag." vol. xi. p. 690.

It may perhaps be objected to the planting of the Oak as a hedgerow tree, that its success, at an early age, is less certain than that of some other trees; this, however, we believe, more frequently results from a want of attention to the proper selection and management of the plants, than to any peculiar delicacy or aversion of the Oak to transplantation. We have succeeded in transplanting the Oak of considerable size, and with as great a certainty of success as any other tree, but, in all cases, care was taken to select plants of sturdy growth, to prepare the ground previously to their reception, and, what is of vital importance, effectually to protect them from injury, and the depredations of cattle, sheep, &c.

Mr. Matthew, also, strongly advocates planting the Oak in hedgerows, and gives some excellent directions to ensure success; in speaking of the size of plants best adapted for this purpose, he recommends those of eight or twelve feet high, and which have been reared in exposed situations, and, he remarks, "we have experienced better success with hardy plants from the exposed side of a hill, having unfibred carrot roots much injured by removal, than with others from a sheltered morass, having the most numerously fibred and well extracted roots." We shall now succinctly advert to the Oak in its ornamental capacity, or its use and importance in landscape scenery, for, independently of those feelings and associations naturally attached to a tree that has so essentially contributed to the glory and welfare of our sea-girt land, it possesses all those characteristics which are considered necessary to give it that value and peculiar effect which alone can satisfy the eye of the painter or the lover of the picturesque. Gilpin, whose taste for natural beauties no one will impugn, after quoting Virgil's graphic description of the Oak, commencing,

Esculus imprimis, &c.

and dwelling upon its massive and well-balanced trunk, characteristic of its firmness and strength, the stoutness of its limbs, appearing, as it were, to be portions of the stem itself, rather than to spring from it like those of most other trees, its twisted and contorted branches, "which like a river sport and play in every direction, sometimes in long reaches and sometimes in shorter elbows," its expansive spread, and its longevity, thus concludes his observations, "I have dwelt the longer on the Oak, as it is confessedly both the most picturesque tree in itself, and the most accommodating in composition. It refuses no subject, either in natural or artificial landscape; it is suited to the grandest, and may with propriety be introduced into the most pastoral. It adds new dignity to the ruined tower and the gothic arch; by stretching its wild moss-grown branches athwart their ivied walls, it gives them a kind of majesty coeval with itself; at the same time, its propriety is still preserved if it throws its arms over the purling brook or the mantling pool, where it beholds

'Its reverend image in the expanse below.'"

Mr Strutt, also, whose delineations of British trees and forest scenery stand unrivalled for their truth, beauty, and artist-like effect, in some valuable remarks on the picturesque beauty of the Oak, contained in the "Mag. of Nat. Hist.," after pointing to the division of the European trees into four forms or classes, viz., the round, the spiry, the shaggy, and the slender topped, thus speaks of the Oak. "In the first of these classes, (the round topped,) foremost in dignity and grandeur, the Oak stands preeminent, and, like the lion among beasts, is the undoubted lord of the forest. Beauty, united with strength, characterizes all its parts. The leaves, elegant in their outline, are strongly ribbed and firmly attached to the spray, which, although thin and excursive, is yet bold and determined in its angles, whilst the abrupt and tortuous irregularity of its massive branches admirably contrasts with the general richness and density of its clustered foliage."

The horizontal direction of the branches, their strong, tortuous, and sinewy aspect, the angular interwoven nature of the spray, are all suited to the pencil, and give to the Oak, even in its denuded state, a richness of appearance possessed by no other tree. Its foliage, also, is such as a painter likes to delineate, being richly tufted and clustered together, forming those masses which produce the finest effect of light and shade, and its colour is warm, rich, and pleasing, from the period that the leaves first burst their cerements to the rich russet tints they acquire previously to their fall in autumn. The tufting of the foliage, we may remark, is much more conspicuous in the peduncled Oak, than in the sessile-fruited variety, and on this account the former surpasses its rival in picturesque effect, for, as the Rev. W. T. Bree observes, "the leaves of the *Quer. pedunculata*, though rather small, are very numerous and grow close to the spray, clustered in those dense masses which constitute one of the characteristic beauties of the Oak," whereas those of *Quer. sessiliflora*, though larger in size, are less thickly set, and, from the length of the petioles, hang loose and straggling, and give to the general aspect of the foliage that want of depth and solidity possessed by the other. In legendary history the Oak appears to have been invested with a sacred character, and to have been the symbol under which the gods of the Celts and ancient Britons were worshipped, for under this form divine honours were paid by the Celts to their god *Teut*, and by the Britons to *Tarnawa*, their god of thunder. The rites of Druidism were many of them performed under the shade of the Oak, and the misseltoe, when found growing upon it, was held in peculiar veneration. It was from the traditionary recollection of the sacred character of the Oak, even after Druidical worship was abolished, that its wood was always appropriated to the most memorable uses, and it is to ceremonies connected with that worship that the origin of the yule log is dated, with which the Christmas fire, even to the present day, is still lighted in this and some other districts of the kingdom.

In concluding the history of the Oak, we must not omit the extraordinary number of insects that are wholly or partially supported by it, amounting, it is supposed, to nearly two thousand species, fifteen hundred of which may be considered to be phytophagous, or actual feeders upon some portion of the tree, the remainder as parasites attached to these, and belonging to the ichneumonidæ, and other parasitic tribes. To enumerate even a tenth of these inhabitants of the Oak would occupy greater space than we can afford; we must, therefore, restrict our remarks to a few of the most remarkable species belonging to the various orders, and this we do with the less compunction for the omission of the rest, as Mr. Westwood has already, in the "Arboretum Britannicum," given an extensive list and interesting account of the Oak-feeding insects. Of those which feed upon the wood chiefly in the larva state, are the caterpillars of the goat moth *(Cossus ligniperda)*, and wood-leopard moth *(Zeuzera æsculi)*, also the grubs of several of the capricorn beetles, among which are *Prionus coriarius* and *Clytus arcuatus*. The *Elater sanguineus*, both in the larva and perfect state, is found in rotten Oak stumps, and the grub of the great stagbeetle, *Lucanus cervus*, is a consumer of the like matter. *Trichius variabilis*, a very rare British insect, occasionally met with in the New Forest, is also an Oakwood eater, as well as several species of *Lymexylon*, which are particularly destructive to Oak timber. Amongst the leaf-feeding species a long list belongs to the lepidopterous order, though the caterpillar of the purple hair-streak *(Thecla quercus)*, is the only one belonging to the butterflies. Of the Sphingidæ, the caterpillar of the beautiful lime hawk moth *(Smerinthus tiliæ)*, is occasionally found upon the Oak, and amongst the Bombyces there are many which feed upon it exclusively, such as the different species of *Chaonia*, *Perridea serrata*, *&c.*, and others only occasionally, as *Lasiocampa quercus*, and *roboris*, *Saturnia pavonia*, and *Tau*, *Pygæra bucephala*, *&c.* Several of the Lithosiidæ are also Oak leaf-eaters, and amongst the numerous Noctuidæ are several species of *Orthosia*, *Glæa*, *Xylina*, and *Xanthia*, also the beautiful *Miselia aprilina*, *Merveil du jour*, the caterpillar, pupa, and imago of which are represented at page 288. Three species of *Catocala* are exclusively Oak-feeders, and another, *Catocala fraxini*, one of the finest of the genus, is occasionally found upon it. Of the Geometridæ, Platyptericidæ, Pyralidæ, Tortricidæ, and remaining groups of the Lepidoptera there are a vast number of Oak-eating species; we must, however, limit our notice to one whose devastations are sometimes so extensive as completely to denude Oak woods of their foliage throughout entire districts: this is the work of the leaf-rolling caterpillar of the pretty little green-coloured moth, the *Tortrix viridana*, which, in some years, appears in countless myriads. Providentially, these visitations rarely, if ever, continue for more than two seasons successively, otherwise the trees would inevitably perish from the renewed deprivation of their leaves, members so essential to their very existence. How the sudden diminution is effected we can only guess at, but, in all probability it is by that beautiful ordination of providence, where a corresponding increase of those parasitic and other enemies takes place of which it is the accustomed and peculiar prey.

Several coleopterous insects in the perfect state also feed upon the leaves of the Oak; among them is the well-known cockchafer *(Melolontha vulgaris)*, the *Orchestes quercus*, or Oak flea, the *Cryptorynchus quercus*, *Agrilus viridis*, *&c.* They are also infested by a species of *Psylla*, by *Aphis roboris*, and *A. quercus*, *Coccus quercus*, *&c.*, and we may here state our belief, deduced from long observation, that the honey dew upon the Oak is invariably the produce of these insects, as we have never been able to trace its presence, except where some of the species were to be detected upon the tree.

Of the various galls or Oak apples, the nidi of different species of cynips, produced by the puncture of the ovipositor of the female upon the different parts where they are found, we shall only mention that, in regard to those beautiful little excrescences so common upon the under side of the leaves of the oak and known by the name of spangles, we, several years ago, ascertained that they were the nidi of a cynips, having reared a great many of the perfect insects from the spangles collected in the autumn, and kept in a cool and rather moist atmosphere during the winter. About the fall of the leaf, these spangles begin to lose their flat mushroom-like form and red hirsute appearance, and become by degrees raised or bossed towards the middle, in consequence of the growth of the enclosed grub, which now becomes visible when the spangle is cut open. The perfect insect makes its appearance in April and May.

The species of lichens, fungi, and mosses which grow upon the Oak are also very numerous, but, as our description has already exceeded its due limits, we must refer our readers to cryptogamic authors and to the list of these plants contained in the "Arboretum Britannicum."

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